Case Study: Reducing Energy Consumption and Carbon Emissions in Chemical Plants

Executive Summary

Customer

Global leader in the production and supply of base chemicals

Challenge

Reduce energy consumption and carbon emissions in all their plants

Solution

Thorough energy analysis, combining expert knowhow, simulation software and various energy saving methodologies

Results

Identified major energy savings opportunities leading to lower production costs and reduced carbon emissions

Our Client is the global leader in the production and supply of base chemicals. It has production facilities worldwide (Europe, North America, Asia) with a total production capacity of different chemicals of nearly 800 kilotons per year.

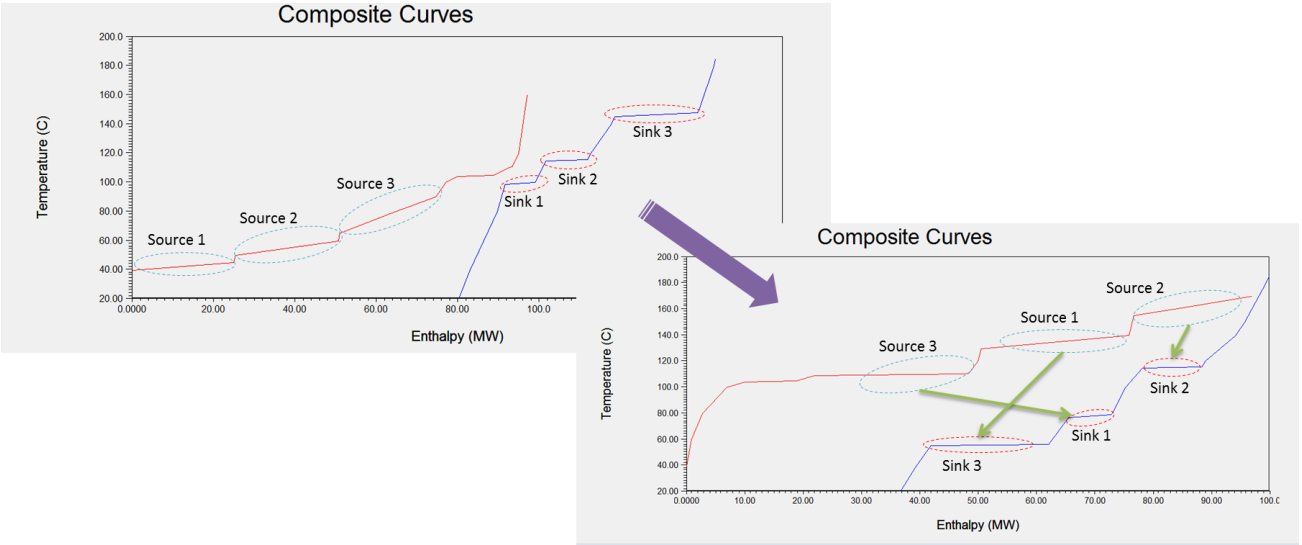
Challenge

As a part of company's sustainability program, Our Client has committed to drastically reduce energy consumption and carbon emissions in all their plants. These targets are set to be achieved within next 10 years. Our client is prepared to invest into redesigns and revamps of the running plants; nevertheless they are facing the following challenges:

1. How to identify energy saving opportunities?
2. How much energy can be saved through plant redesigns?
3. Identify process parameters which modification will lead to major energy savings?

Solution

Combining sophisticated simulation tools, various energy analysis methodologies and vast industrial experience, Maturus Optimi provided a solution that meets Our Client's challenges. For a large capacity plant a number of energy saving opportunities have been identified leading to a potential reduction of up to 30 MW in steam and 30 MW in cooling water. Applying principles of pinch methodology allowed us to determine the energy status of the plant and estimate the maximum heat recovery by simple process redesigns. More thorough process and energy analysis indicated the most suitable operating parameters to be modified to further minimize utility consumption. Temperature levels of process heat sinks and sources were adjusted accordingly so that the heat recovery between process units is maximized.



Example: Adjustment of process heat sources and sinks to maximize the heat recovery

The solutions include targeting of distillation columns and stripper pressures, allowing the best heat integration match between background process and column's reboilers and condensers. Furthermore, thermal analysis of large distillation columns suggested design modification with placement of side reboilers and pumparounds leading to reduction of both cooling water and steam supply to the column. Targeting reaction temperatures motivated Our Client's research team to consider new reaction conditions and alternative catalysts, so that the reaction heat fits better to the heat profile of the reset of the plant and reduce further energy costs.

Results

The energy efficiency study performed by Maturus Optimi, added great value to Our Client's business by helping them to achieve the following results:

- Meet their challenges concerning process energy savings
- Find major energy savings opportunities within the processes
- Reduce plant steam consumption up to 30 MW and cooling water consumption up to 30 MW
- Reduce carbon emissions
- Reduce production costs
- Providing guidance and focus to company's research (targeting process parameter ranges, optimal operating window for process equipment, etc.)

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